

TRANSMITTAL LETTER TO THE UNITED STATES

ATTORNEY'S DOCKET NUMBER 50520DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/06561	11 July 2000	26 July 1999

TITLE OF INVENTION: PURIFICATION OF OLEFIN-CONTAINING FEED STREAMS IN POLYMERIZATION OR ALKYLATION PROCESSES

APPLICANT(S) FOR DO/EO/US Hermann UHR, Wolfgang VODRAZKA, Konrad MITULLA, Juergen DOSCH, Eckhard STROEFER, Ulrich MUELLER, Heinrich LAIB

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. /X/ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
 2. / / This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
 3. /X/ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
 4. /X/ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
 5. /X/ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a./X/ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b./ / has been transmitted by the International Bureau.
 - c./ / is not required, as the application was filed in the United States Receiving Office (RO/USO).
 6. /X/ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
 7. /X / Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a./X / are transmitted herewith (required only if not transmitted by the International Bureau).
 - b./ / have been transmitted by the International Bureau.
 - c./ / have not been made; however, the time limit for making such amendments has NOT expired.
 - d./ / have not been made and will not be made.
 8. /X / A translation of the amendments to the claims under PCT Article 19(35 U.S.C. 371(c)(3)).
 9. /X / An oath or declaration of the inventor(s)(35 U.S.C. 171(c)(4)).
 - 10./ / A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11. to 16. below concern other document(s) or information included:
- 11./ / An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
 - 12./X / An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
 - 13.x / A FIRST preliminary amendment.
 - / / A SECOND or SUBSEQUENT preliminary amendment.
 - 14./ / A substitute specification.
 - 15./ / A change of power of attorney and/or address letter.
 - 16./x / Other items or information.
 - International Search Report
 - International Preliminary Examination Report

U.S. Appl. No. (If Known) INTERNATIONAL APPLN. NO.
 PCT/EP00/06561

ATTORNEY'S DOCKET NO.
 50520

	CALCULATIONS	PTO USE ONLY
17. /X/ The following fees are submitted		
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):		
Search Report has been prepared by the		
EPO or JPO.....\$890.00	890.00	
International preliminary examination fee paid to USPTO		
(37 CFR 1.482).....\$710.00		
No international preliminary examination fee paid to		
USPTO (37 CFR 1.482) but international search fee paid		
to USPTO (37 CFR 1.445(a)(2)).....\$740.00		
Neither international preliminary examination fee		
(37 CFR 1.482) nor international search fee		
(37 CFR 1.445(a)(2)) paid to USPTO\$ 1,040.00		
International preliminary examination fee paid to		
USPTO (37 CFR 1.482) and all claims satisfied pro		
-visions of PCT Article 33(2)-(4).....\$100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT = \$	890.00	
Surcharge of \$130.00 for furnishing the oath or declaration		
later than / / 20 / 30 months from the earliest		
claimed priority date (37 CFR 1.492(e)).		
Claims	Number Filed	Number Extra
		Rate
Total Claims	9 -20	X\$18.
Indep. Claims	1 -3	X\$84.
Multiple dependent claim(s) (if applicable)		+280.
TOTAL OF ABOVE CALCULATION	=	890.
Reduction of 1/2 for filing by small entity, if applicable.		
Verified Small Entity statement must also be filed		
(Note 37 CFR 1.9, 1.27, 1.28).		
SUBTOTAL	=	890.
Processing fee of \$130. for furnishing the English		
translation later than / / 20 / 30 months from the		
earliest claimed priority date (37 CFR 1.492(f)).	+	
TOTAL NATIONAL FEE	=	890.
Fee for recording the enclosed assignment (37 CFR 1.21(h)).		
The assignment must be accompanied by an appropriate cover		
sheet (37 CFR 3.28, 3.31) \$40.00 per property	=	40.
TOTAL FEES ENCLOSED	=	\$ 930.00
	Amount to be	
	refunded:	\$
	Charged	\$

a./X/ A check in the amount of \$ 930.00 to cover the above fees is enclosed.

b./I/ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c./X/ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-0345. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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 Washington, D. C. 20036

SIGNATURE

Herbert B. Keil

NAME

Registration No. 18,967

10030431

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of)
UHR et al.) BOX PCT
)
International Application)
PCT/EP 00/06561)
)
Filed: July 11, 2000)
)

For: PURIFICATION OF OLEFIN-CONTAINING FEED STREAMS IN
POLYMERIZATION OR ALKYLATION PROCESSES

PRELIMINARY AMENDMENT

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

Prior to examination, kindly amend the above-identified application as follows:

IN THE CLAIMS

Kindly amend the claims as shown on the attached sheets.

R E M A R K S


The claims were amended in the preliminary examination. The claims have been amended further to eliminate multiple dependency and to place them in better form for U.S. filing. No new matter is included.

A clean copy of the claims is attached.

Favorable action is solicited.

Respectfully submitted,

KEIL & WEINKAUF


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(202)659-0100

10030431-0100

0050/505206 - CLEAN VERSION OF AMENDED CLAIMS

3. A process as claimed in claim 1, wherein the adsorption layer comprises a zeolite of the type ZSM-5, ZSM-11, ZSM-12, ZSM-22, ZSM-23, ZSM-35, ZSM-48, beta-zeolite, zeolite Y, dealuminated zeolite Y, mordenites, zeolite MCM-22, MCM-41, MCM-49 or MCM-56.
4. A process as claimed in claim 1, wherein the adsorption layer is located in a fixed-bed reactor.
5. A process as claimed in claim 1, wherein the feed stream is passed over the adsorption layer at from 0 to 300°C and a pressure in the range from 1 to 45 bar.
6. A process as claimed in claim 1, wherein the olefin used is ethylene or propylene.
7. A process as claimed in claim 1, wherein the catalysts used are Lewis acids or zeolites.
8. A process as claimed in claim 1, wherein the reaction is carried out in the liquid or gaseous phase.
9. A process as claimed in claim 1, wherein benzene-containing feed streams are also passed over an adsorption layer.

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0050/505206 - MARKED VERSION OF AMENDED CLAIMS

3. A process as claimed in claim 1 [or 2], wherein the adsorption layer comprises a zeolite of the type ZSM-5, ZSM-11, ZSM-12, ZSM-22, ZSM-23, ZSM-35, ZSM-48, beta-zeolite, zeolite Y, dealuminated zeolite Y, mordenites, zeolite MCM-22, MCM-41, MCM-49 or MCM-56.
4. A process as claimed in claim 1 [any of claims 1 to 3], wherein the adsorption layer is located in a fixed-bed reactor.
5. A process as claimed in claim 1 [any of claims 1 to 4], wherein the feed stream is passed over the adsorption layer at from 0 to 300°C and a pressure in the range from 1 to 45 bar.
6. A process as claimed in claim 1 [any of claims 1 to 5], wherein the olefin used is ethylene or propylene.
7. A process as claimed in claim 1 [any of claims 1 to 6], wherein the catalysts used are Lewis acids or zeolites.
8. A process as claimed in claim 1 [any of claims 1 to 7], wherein the reaction is carried out in the liquid or gaseous phase.
9. A process as claimed in claim 1 [any of claims 1 to 8], wherein benzene-containing feed streams are also passed over an adsorption layer.

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CLAIMS AS FILED

1. A process for preparing alkylbenzenes by catalytic reaction of benzene and olefins, which comprises passing the olefin-containing feed stream over an adsorption layer for purification.
2. A process as claimed in claim 1, wherein the adsorption layer comprises carbon black, activated carbon, aluminum oxides, silica gels, natural or synthetic aluminates, silicates, aluminum silicates or zeolites.
3. A process as claimed in claim 1, wherein the adsorption layer comprises a zeolite of the type ZSM-5, ZSM-11, ZSM-12, ZSM-22, ZSM-23, ZSM-35, ZSM-48, beta-zeolite, zeolite Y, dealuminated zeolite Y, mordenites, zeolite MCM-22, MCM-41, MCM-49 or MCM-56.
4. A process as claimed in claim 1, wherein the adsorption layer is located in a fixed-bed reactor.
5. A process as claimed in claim 1, wherein the feed stream is passed over the adsorption layer at from 0 to 300°C and a pressure in the range from 1 to 45 bar.
6. A process as claimed in claim 1, wherein the olefin used is ethylene or propylene.
7. A process as claimed in claim 1, wherein the catalysts used are Lewis acids or zeolites.
8. A process as claimed in claim 1, wherein the reaction is carried out in the liquid or gaseous phase.
9. A process as claimed in claim 1, wherein benzene-containing feed streams are also passed over an adsorption layer.

10030431 011002

Purification of olefin-containing feed streams in polymerization or alkylation processes

- 5 The present invention relates to a process for purifying olefin-containing feed streams in polymerization or alkylation processes and also to processes for preparing alkylbenzenes by catalytic reaction of benzene and olefins.
- 10 Ethylbenzene is predominantly obtained by catalytic alkylation of benzene using ethylene. Aluminum chloride is used as catalyst in the liquid phase while Lewis acids or synthetic zeolites are used as catalysts in the gas phase. Zeolites are highly active catalysts both for alkylation and for transalkylation. Although
- 15 the zeolite catalysts are less susceptible to water, sulfur and other catalyst poisons, they lose their activity as time goes on and have to be regenerated periodically.

- Various methods of prolonging the life of zeolite catalysts for
- 20 alkylation reactions have been proposed. WO 98/07673 describes the alkylation of benzene using, for example, propylene. The benzene was pretreated by passing it over mordenites.

- According to WO 89/12613, the life of zeolite catalysts in the
- 25 transalkylation of polyalkylbenzenes can be increased by addition of gaseous hydrogen.

- US 5,030,786 proposes reducing the water content of the aromatic feed stream to below 100 ppm in the alkylation or transalkylation
- 30 reaction over zeolite catalysts. On the other hand, WO 93/00992 finds that, particularly in the running-up phase, the zeolite catalyst in the alkylation or transalkylation should have a minimum water content of more than 3.5% by weight, based on the catalyst composition.

- 35 Most ethylene is produced in steam crackers. The ethylene content is generally above 99.9% by weight. In addition, it contains small amounts of sulfur, oxygen, acetylene, hydrogen, carbon monoxide and carbon dioxide. Apart from the production of
- 40 ethylbenzene, ethylene is used in large amounts for polymerization to form polyethylenes such as HDPE, LDPE and LLDPE. Polymerization in particular is carried out using a "polymer grade ethylene".

- 45 It is an object of the present invention to find a process for improving the activity of catalysts for olefin polymerization. Furthermore, a process for prolonging the life and reducing the

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recycling times of alkylation or transalkylation catalysts in the catalytic alkylation of benzene using olefins, particularly over zeolite catalysts, is to be found.

- 5 We have found that this object is achieved by a process for purifying olefin-containing feed streams in polymerization or alkylation processes, which comprises passing the feed stream over an adsorption layer.
- 10 In principle, the process can also be used for olefin-containing feed streams in other processes. However, it is particularly suitable for polymerization and alkylation processes in which catalysts which are sensitive to very small amounts of impurities are used.
- 15 Preferred embodiments may be found in the subordinate claims 2 to 10.
- Adsorbents suitable for the adsorption layer are
- 20 carbon-containing adsorbents such as carbon blacks, activated carbon or carbon molecular sieves, oxygen-containing compounds such as aluminum oxides, silica gels, natural or synthetic aluminates, silicates, aluminum silicates or zeolites and molecular sieves. Structure, properties and preparation of
- 25 zeolites are described, for example, in Zeolite Molecular Sieves, Donald W. Breck, John Wiley & Sons, 1974; Atlas of Zeolite Structure Types, 3rd Ed. W.M. Meier and D. H. Olson, Butterworth-Heinemann, 1992 or Handbook of Molecular Sieves, R. Szostak, Chapman & Hall, New York, 1992. Preferred zeolites are
- 30 those of the types ZSM-5, ZSM-11, ZSM-12, ZSM-22, ZSM-23, ZSM-35, ZSM-48, beta-zeolite, zeolite Y, dealuminated zeolite Y, mordenites, zeolite MCM-22, MCM-41, MCM-49 and MCM-56. Preference is also given to alumina or activated aluminum oxide, particularly for alkaline impurities. Fuller's earths are also
- 35 sometimes used. Owing to the surface properties, preference is given to using carbon-containing adsorbents for organic and nonpolar impurities.
- In general, the adsorbents are used in the form of spheres, rods
- 40 or granules having an external dimension of from 1 to 10 mm.

The process of the present invention can be carried out in adsorbents containing fixed, moving or fluidized beds, batchwise or continuously. The adsorption layer is particularly preferably

45 located in a fixed-bed reactor. Use is advantageously made of two or more fixed-bed adsorbents which can be operated alternately for the purification of the olefin stream and for regeneration. The

size of the adsorber depends on the type and amount of impurities and on the desired regeneration cycles.

- In general, the olefin feed stream is passed over the adsorption layer at from 0 to 300°C, preferably from 50 to 250°C, and a pressure in the range from 1 to 45 bar.

As olefin, preference is given to using ethylene or propylene. Particular preference is given to using "polymer grade" ethylene.

- 10 Typical specifications for ethylene may be found in Ullmann, Encycl. of Industrial Chemistry, Vol. A10, page 87, and Kirk-Othmer, Encyclopedia of Chemical Technology, 4th Edition, Vol 9, page 907.

- 15 The process of the present invention is preferably used for the pretreatment of ethylene or propylene feed streams in the catalytic alkylation of benzenes, in particular by means of alkylation reactions catalyzed by Lewis acids or zeolites. Such processes are described, for example, in Ullmann, Encycl. of Industrial Chemistry, 5th Ed. Vol A10, pages 35 to 43. It is particularly preferably used in the zeolite-catalyzed alkylation or transalkylation of benzene and ethylene. Such processes and suitable catalysts are described, for example, in US 5,902,917, US 4,891,448, US 5,081,323, US 5,198,595, US 5,243,116 or 20 WO 98/07673.

In the zeolite-catalyzed alkylations, the adsorption layer particularly preferably comprises a zeolite of the same type as the zeolites used for the catalyst or a zeolite having similar 30 pore diameters and pore size distribution.

- In the alkylation of benzene, not only the ethylene or propylene feed stream but also the feed streams comprising benzene or alkylbenzene and polyalkylbenzene are advantageously passed over 35 an appropriate adsorption layer. Adsorbents which can be used for this purpose are those which are used for the olefin feed stream.

Examples

- 40 Example 1

330 kg of predried ethylene containing 6 ppb (10^{-9} kg/kg) of organically bound nitrogen (total organic nitrogen = TON) from the steam cracker of BASF Aktiengesellschaft in Ludwigshafen were 45 passed through a 5 000 mm long column having a diameter of 50 mm for 1 week at room temperature. The column was packed with 330 g of Selexsorb COS® (fill height 2 000 mm). The ethylene flow was

26 liters/min. The adsorbent was then flushed with nitrogen having a temperature of 300°C (20 liters/h) for 5 hours. During this treatment, the adsorbed, basic, nitrogen-containing compounds were desorbed from the Selexsorb COS. The nitrogen was passed through wash bottles in which 0.1N H₂SO₄ was present. The basic compounds were converted into their sulfuric acid salts in this way. The content of N-containing basic compounds in the washing liquid was determined by the chemiluminescence method (ASTM D 6069).

Examples 2 to 4

Example 1 was repeated using the adsorbents indicated in the table. In Examples 3 and 4, desorption was achieved by elution of the adsorbent with 1N H₂SO₄. The results are shown in the table. The recovery is a measure of the adsorption efficiency.

Table: Purification of ethylene containing 6 ppb of TON (total organic nitrogen)

Ex-ample	Adsorbent	Desorption	Adsorbed amount of TON** in 10 ⁻⁹ kg of N/kg of ethylene	Recovery in %
1	Selexsorb COS	Nitrogen, 300°C	4	67
2	Sylobead MS 544 HP	Nitrogen, 300°C	2	33
3	Amberlyst 36 W	1N H ₂ SO ₄	5	83
4	Tonsil CO 614 G	1N H ₂ SO ₄	5	83

Adsorbents:

A: Selexsorb COS: activated aluminum oxide from Alcoa

B: Sylobead MS 544 HP: highly porous, crystalline aluminum silicate from Grace Davison, pore diameter about 10 Å

C: Amberlyst 36 W: sulfonated divinylbenzene-styrene copolymer from Rohm & Haas

D: Tonsil CO 614 G: aluminum silicate from Süd-Chemie

We claim:

1. A process for preparing alkylbenzenes by catalytic reaction of benzene and olefins, which comprises passing the olefin-containing feed stream for purification over an adsorption layer.
2. A process as claimed in claim 1, wherein the adsorption layer comprises carbon black, activated carbon, aluminum oxides, silica gels, natural or synthetic aluminates, silicates, aluminum silicates or zeolites.
3. A process as claimed in claim 1 or 2, wherein the adsorption layer comprises a zeolite of the type ZSM-5, ZSM-11, ZSM-12, ZSM-22, ZSM-23, ZSM-35, ZSM-48, beta-zeolite, zeolite Y, dealuminated zeolite Y, mordenites, zeolite MCM-22, MCM-41, MCM-49 or MCM-56.
4. A process as claimed in any of claims 1 to 3, wherein the adsorption layer is located in a fixed-bed reactor.
5. A process as claimed in any of claims 1 to 4, wherein the feed stream is passed over the adsorption layer at from 0 to 300°C and a pressure in the range from 1 to 45 bar.
6. A process as claimed in any of claims 1 to 5, wherein the olefin used is ethylene or propylene.
7. A process as claimed in any of claims 1 to 6, wherein the catalysts used are Lewis acids or zeolites.
8. A process as claimed in any of claims 1 to 7, wherein the reaction is carried out in the liquid or gaseous phase.
9. A process as claimed in any of claims 1 to 8, wherein benzene-containing feed streams are also passed over an adsorption layer.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro



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1. Februar 2001 (01.02.2001)

PCT

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199 34 144.3 26. Juli 1999 (26.07.1999) DE

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(81) Bestimmungsstaaten (national): BR, CN, US.

(84) Bestimmungsstaaten (regional): europäisches Patent (AT,
BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

Veröffentlicht:

— Mit internationalem Recherchenbericht.

Zur Erklärung der Zweibuchstaben-Codes, und der anderen
Abkürzungen wird auf die Erklärungen ("Guidance Notes on
Codes and Abbreviations") am Anfang jeder regulären Ausgabe
der PCT-Gazette verwiesen.

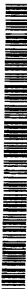
(54) Title: METHOD FOR PURIFYING OLEFIN-CONTAINING SUPPLY FLOWS IN POLYMERISATION OR ALKYLATION
PROCESSES

(54) Bezeichnung: VERFAHREN ZUR REINIGUNG VON OLEFINE ENTHALTENDEN ZUFUHRSTRÖMEN IN POLYME-
RISATIONS- ODER ALKYLIERUNGSVERFAHREN

(57) Abstract: The present invention relates to a method for purifying olefin-containing supply flows in polymerisation or alkylation
processes, wherein said method involves feeding the supply flow through an adsorption layer. The invention also relates to methods
for producing alkylbenzenes by the catalytic reaction of benzene and olefins fed through an adsorption layer.

(57) Zusammenfassung: Ein Verfahren zur Reinigung von Olefine enthaltenden Zufuhrströmen in Polymerisations- oder Alky-
lierungsverfahren, wobei man den Zufuhrstrom über eine Adsorptionsschicht leitet, sowie Verfahren zur Herstellung von Alkylbenzolen
durch katalytische Umsetzung von Benzol und Olefinen, die über eine Adsorptionsschicht geleitet wurden.

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Declaration, Power of Attorney and Petition

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We (I), the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

PURIFICATION OF OLEFIN-CONTAINING FEED STREAMS IN
POLYMERIZATION OR ALKYLATION PROCESSES

the specification of which

☐ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and amended on _____.

☒ was filed as PCT international application

Number PCT/EP/00/06561 _____

on 11 July 2000 _____,

and was amended under PCT Article 19

on _____ (if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application(s)

Application No.	Country	Day/Month/Year	Priority Claimed
19934144.3	Germany	26 July 1999	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

We (I) hereby claim the benefit under Title 35, United States Codes, § 119(e) of any United States provisional application(s) listed below.

_____	_____
(Application Number)	(Filing Date)
_____	_____
(Application Number)	(Filing Date)

We (I) hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application Serial No.	Filing Date	Status (pending, patented, abandoned)
_____	_____	_____
_____	_____	_____
_____	_____	_____

And we (I) hereby appoint HERBERT B. KEIL, Registration Number 18,967; and RUSSEL E. WEINKAUF, Registration Number 18,495; the address of both being Messrs. Keil & Weinkauff, 1101 Connecticut Ave., N.W., Washington, D.C. 20036 (telephone 202-659-0100), our attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the patent, and to transact all business in the Patent Office connected therewith.

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

1-0
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Hermann Uhr
Signature of Inventor

Date July 27, 2000

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Signature of Inventor

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Signature of Inventor

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7-00
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